



Nov. 2018

WFC

<http://www.wonderf-c.com>

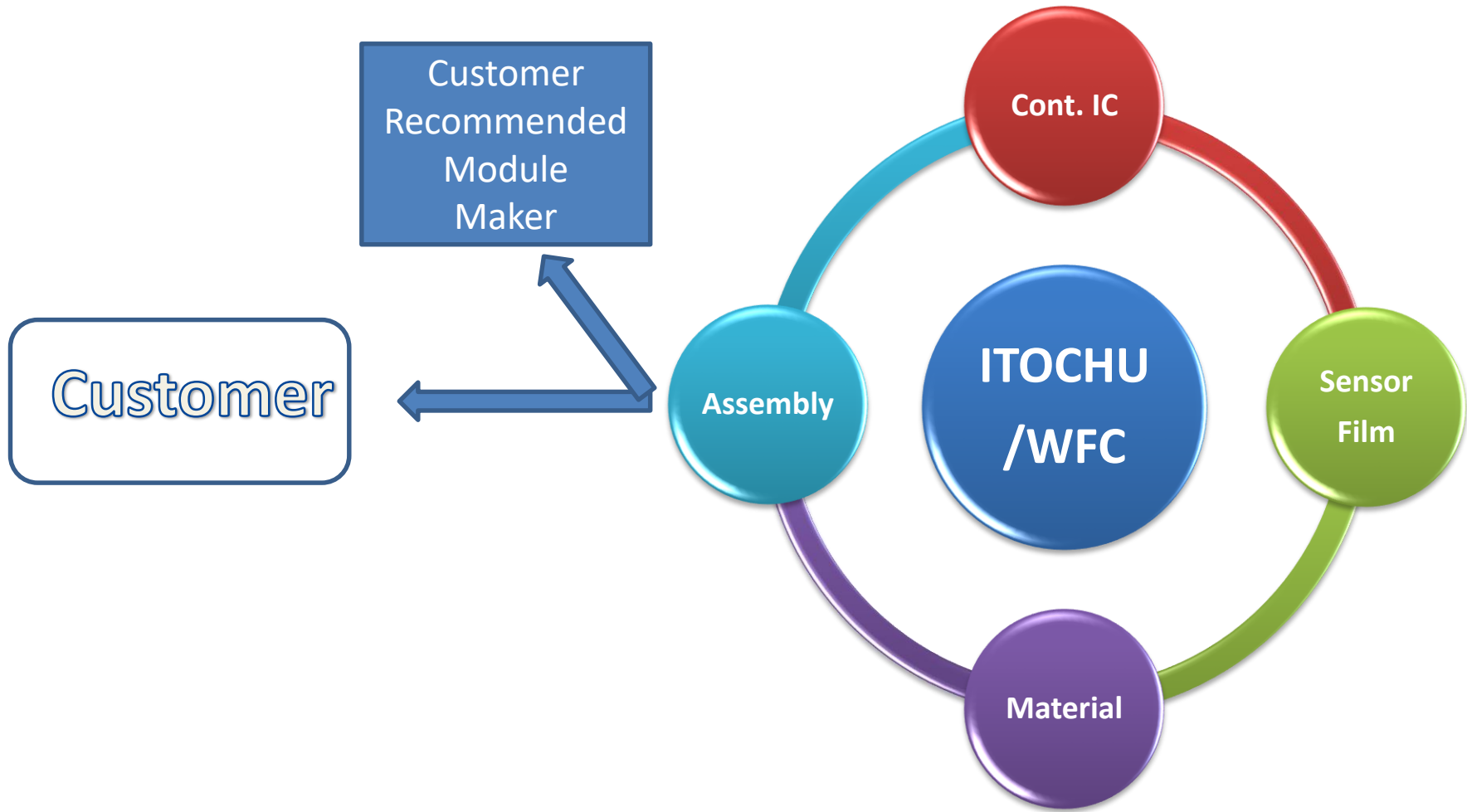
**Wonder Future Corporation
Koki Fukuda
E-mail fukudak@wonderf-c.com**

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INTRODUCTION

- **Wonder future Corporation (WFC) was founded in April,2013 by engineers of LCD Display, Touch Panel and Semiconductor for the purpose of developing new electronic device.**
- **New Capacitive Plastic Touch Panel was developed in May, 2013. (JP#5347096)**
- **Promoting collaborative engineering with major domestic partners to realize our goal in cooperation with Itochu Corporation.**

COLLABORATIVE ENGINEERING WFC scheme



WFC Products Strategy (3 arrows)

OTP(Outer Touch Panel)

- Proposing new Plastic Touch Panel enabling curved surface input/output
- Realizing novel design with integration of excoriation resistance exterior



OTP-β(Outer Touch Panel – β)

- To realize bigger size than OTP with thin thickness, WFC put on the narrow frame with laminated Touch sensor and the cover plastic with the hard coat.

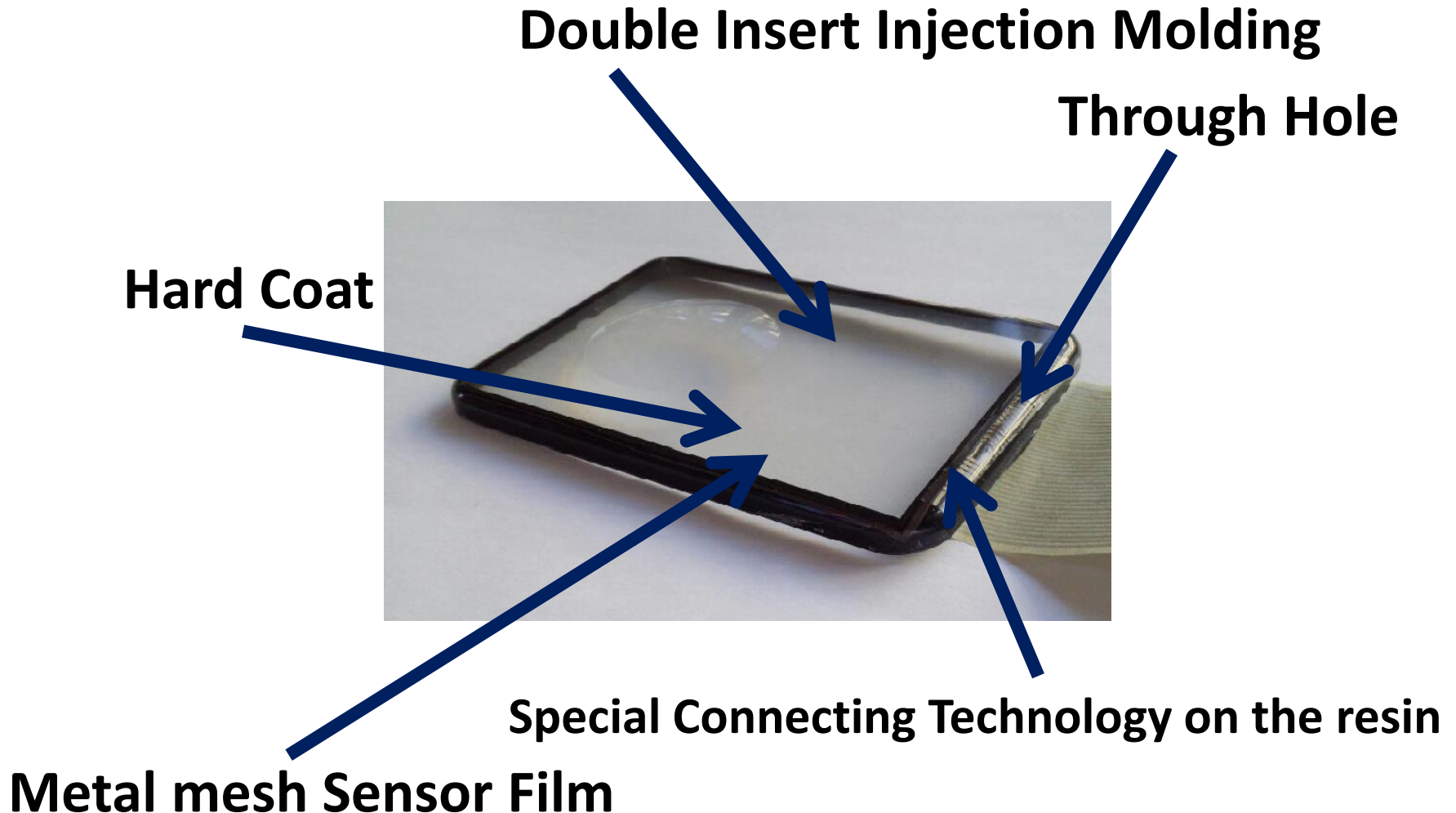


IH Spot Connection Technology

- WFC provide the solder connection on the plastic base film with FPCB with Induction Heating Technology.



OTP Technology by WFC Collaboration Team



AVAILABLE CAPACITIVE T/P

[G2(OGS)]

Cover Glass
ITO
Insulator
ITO

[GFF]

Cover Glass
OCA
ITO
Film
ITO
Film

[G1F]

Cover Glass
ITO
OCA
ITO
Film

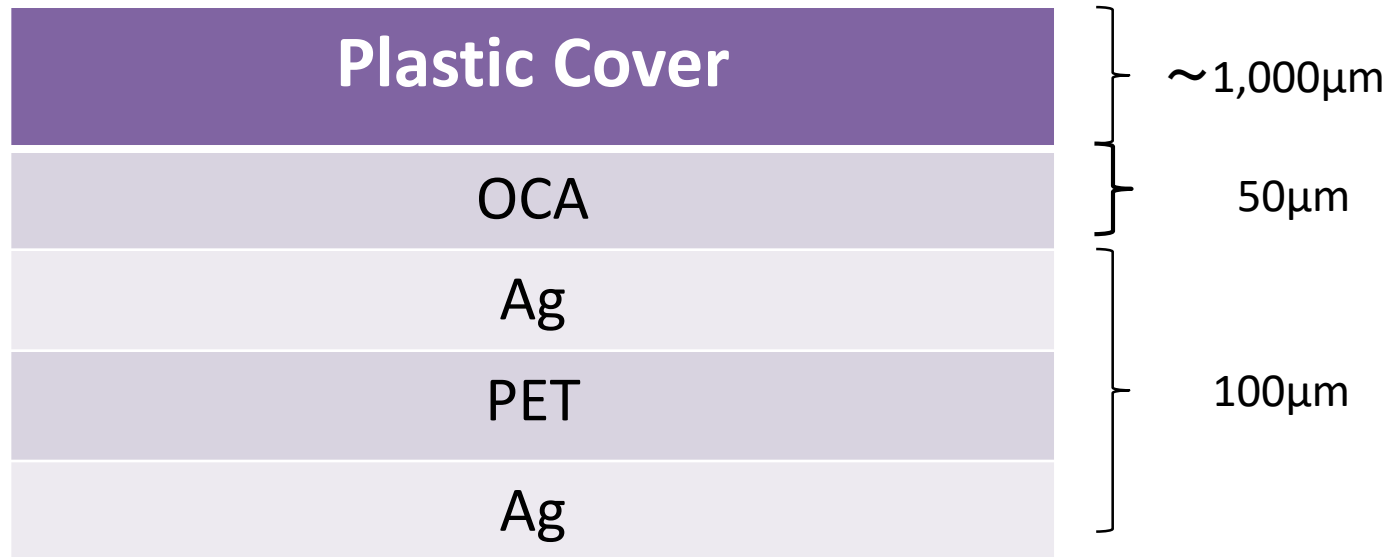
*Application

Tablet PC

Smart Phone
Tablet PC

Mini Tablet

Basic Structure of PF2



Plastic Cover : HC/PMMA/PC/PMMA
HC/Poly Ester

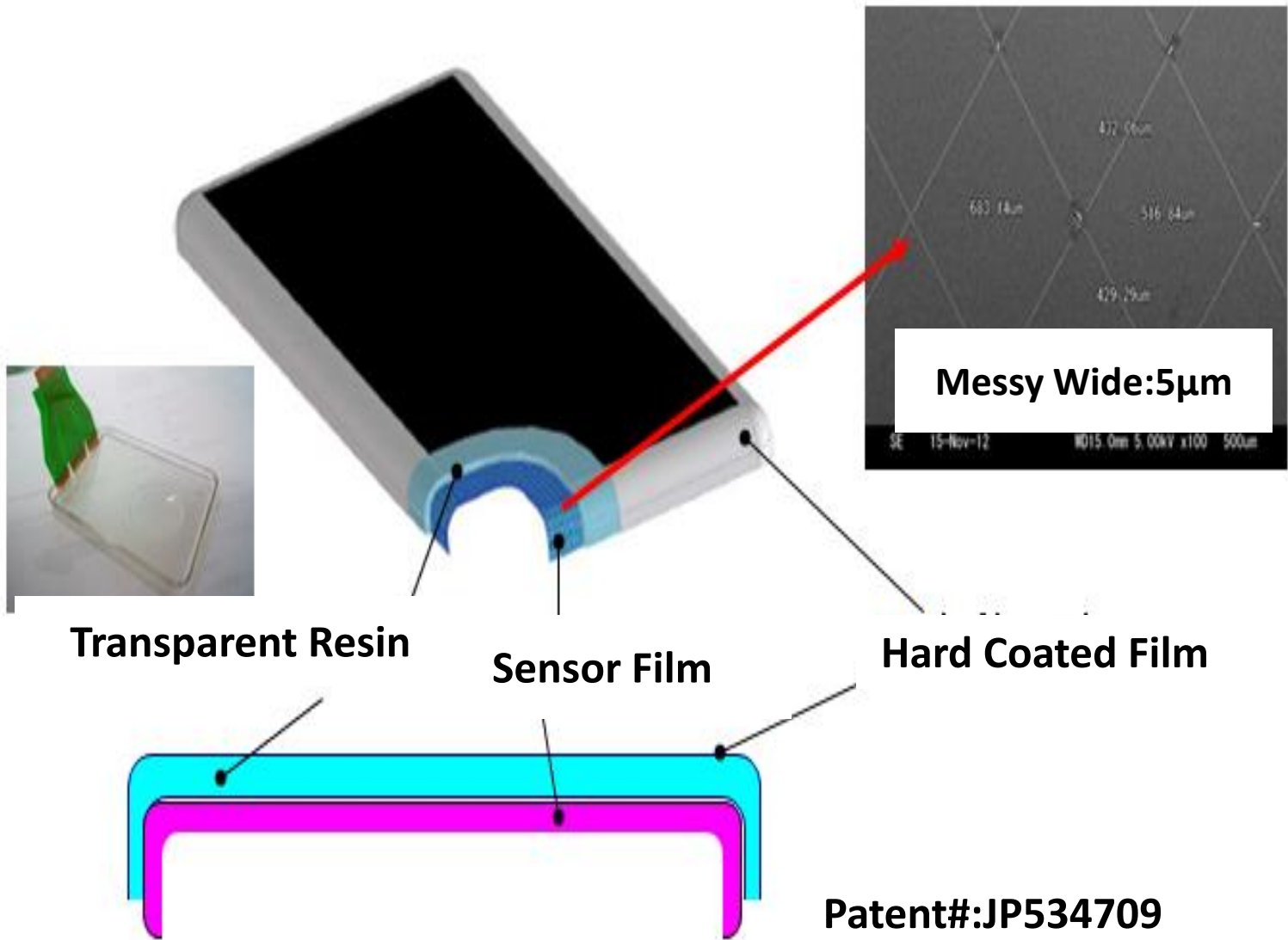
Sensor : Silver halide mesh pattern

Application : PC, Monitor, Tablet PC

Sensor Materials

	Ag Mesh (Fuji Film)	Cu Mesh (Toppan Printing)	ITO
Resistance (Ω/\square)	Mesh: 50 Wire: 0.1	Mesh: ~ 5 Wire: 0.01	150 \sim 300
Transmittance (%)	88	87.2	86
Haze (%)	<1.2	<2	0.9 \sim 3
Pattern	Photographic Double sides <5 μ m	Photo Etching Double sides <3 μ m	Photo Etching single side
Metal Circuit Process	Photographic Double sides: 50 μ /50 μ	Photo Etching Double sides: 50 μ /50 μ	Others
3D Process	◎	○	×

OTP Structure



Transparent Resin

Sensor Film

Hard Coated Film

Patent#:JP534709

OTP Production Process 1

Touch Panel Sensor

Hard Coating

◆ Sensor Maker
↓
Roll Supply

◆ Through-Hole Maker
Through-Hole Processing

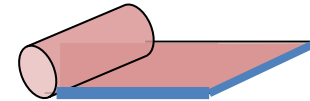


◆ Forming Maker - Preforming



A

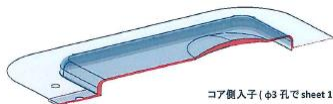
◆ Film Maker
Producing simple mold hard coat film by Acier (hard coat material)



◆ Forming Maker - Preforming



B



コア挿入子 (φ3 孔) sheet 1

Molding Maker
Double Injection Molding

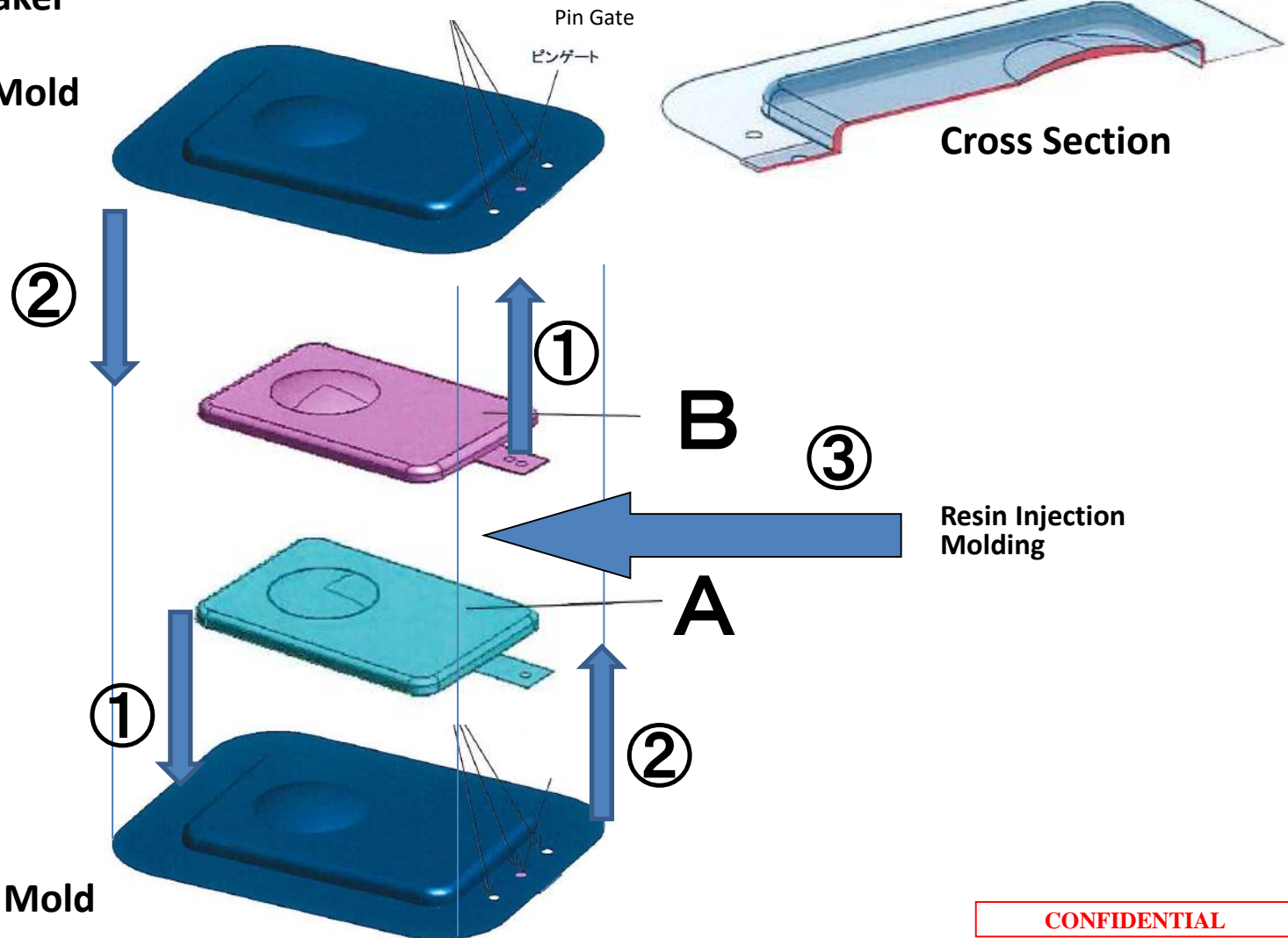


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OTP Production Process2

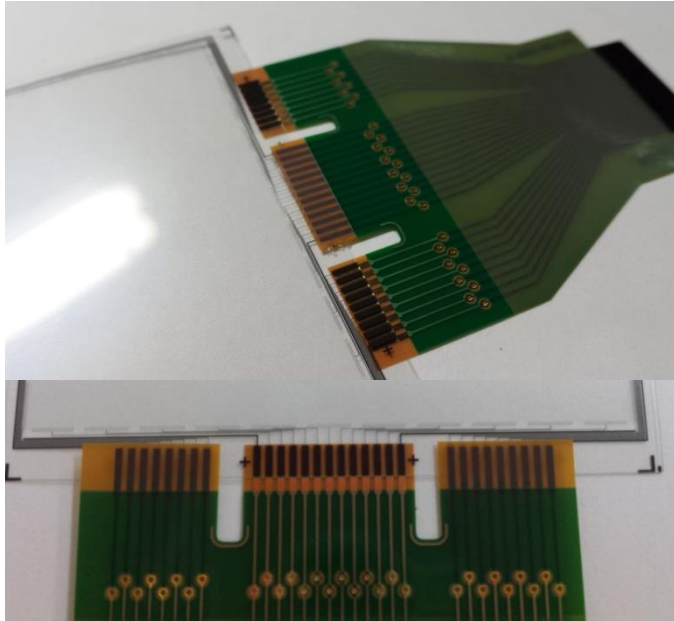
◆ Molding Maker

Metal Mold



Through Hole 1

Double-sided FPC

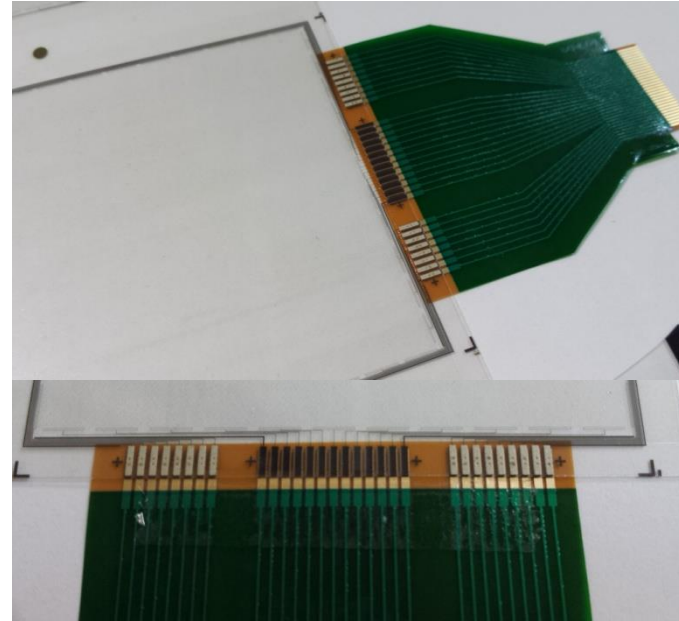


Ex clear Cross Section

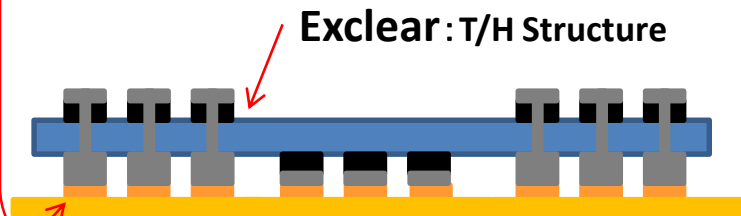


FPC

Low Cost Single side FPC

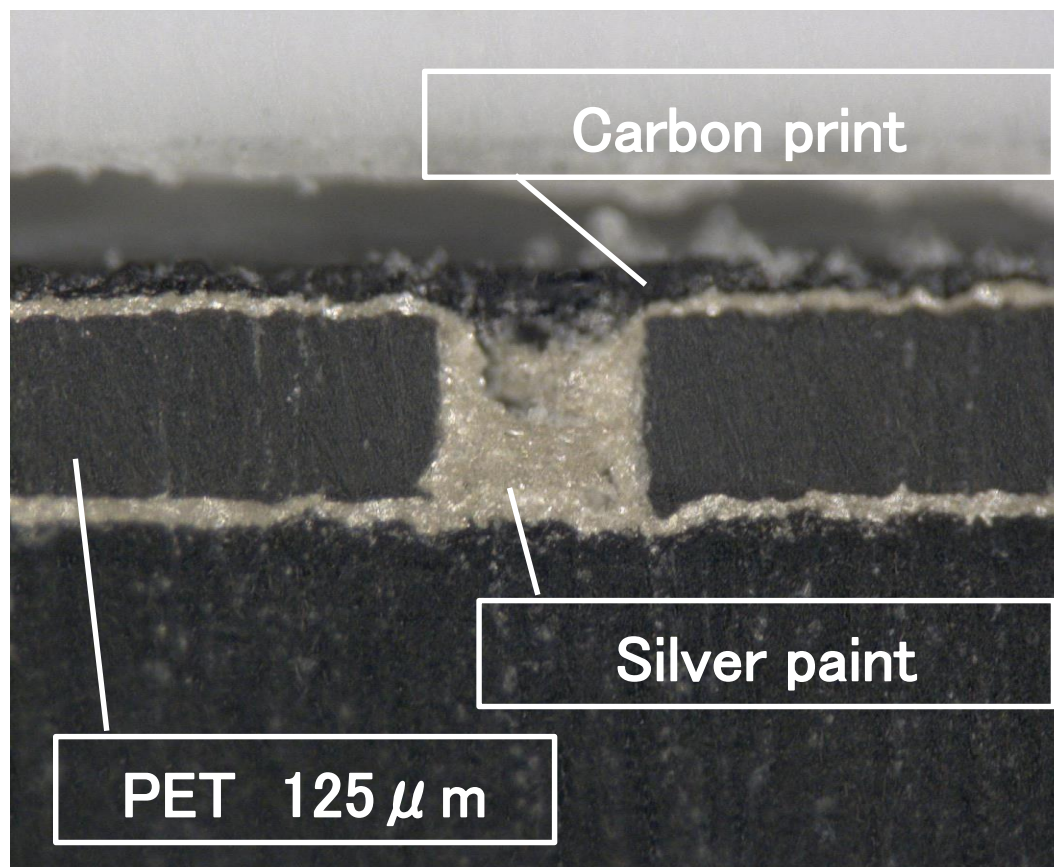


Cross Section



Provision of Material : Nippon Graphite Industries, Ltd.
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Through Hole 2



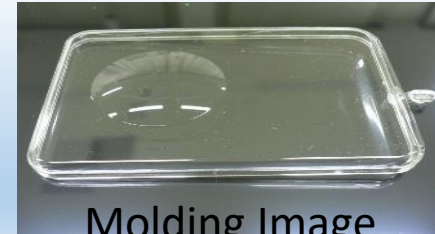
Through-Hole Cross Section

◆Characteristics

- 1) Deformable properties allow to the insertion mold processes, such as drawing, bending and embossing, before the material cured**.
- 2) Superior properties of hardness, scuff-resistance and oleophobic surface.
- 3) High transparency as depending on the base film. Acrylic film preferable.

◆Application ideas

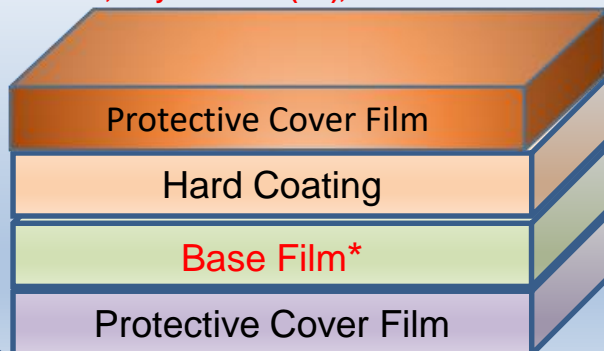
- 1) Home appliances, Mobile devices, Toys, Decorative containers & bottles, Display cases
- 2) Interior parts & finishing for Automobiles, Aircrafts, Other vehicles
- 3) Replacement for Glass surface components



Molding Image

◆Sheet Configuration

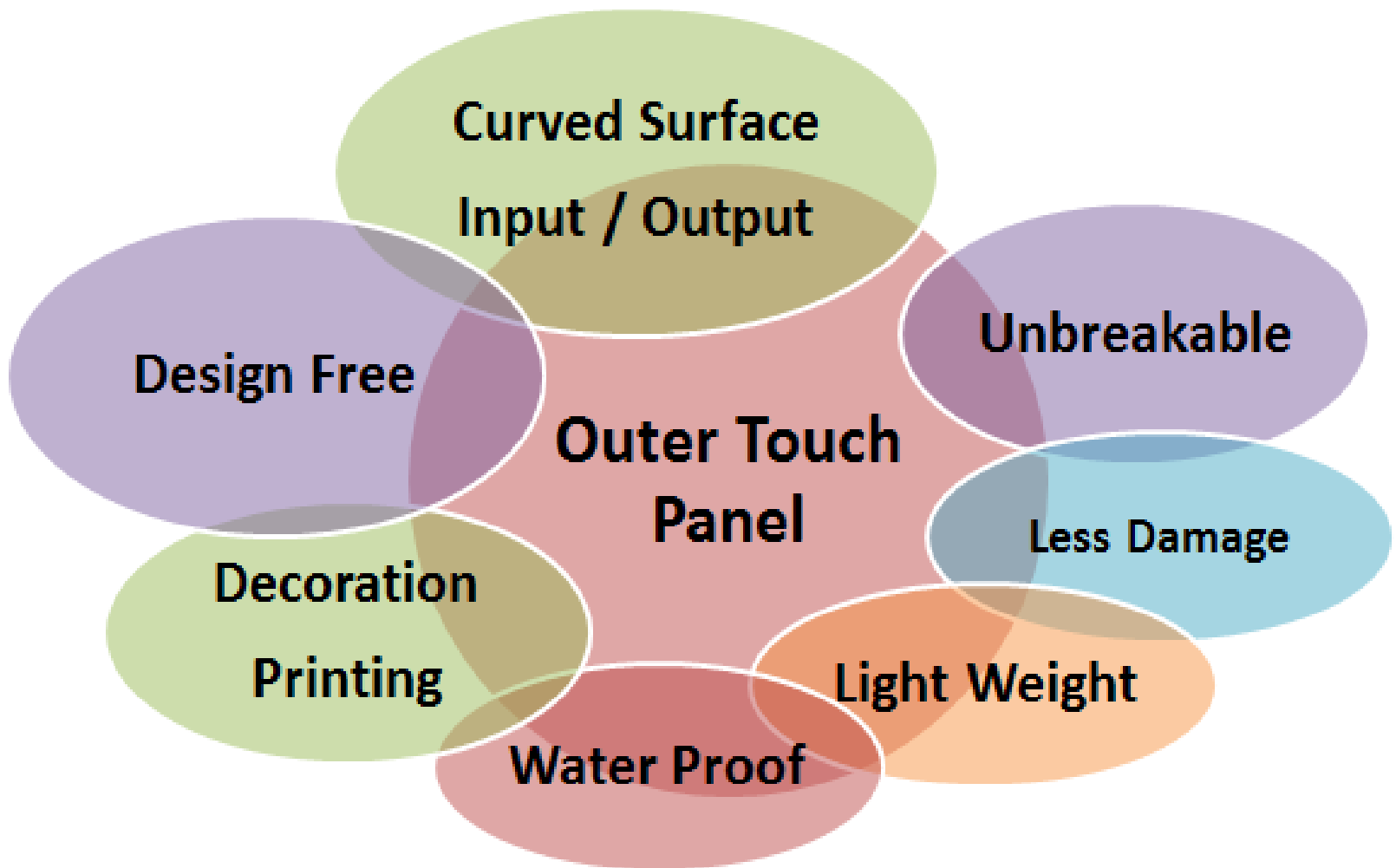
* Ask us for Base film material to be options;
PMMA, Polycarbonate (PC), etc.



Properties***	Unit	Without Hard-coating (after molding)	With Hard-coating (after molding)	Test method
Total light transmittance	%	93.6	92.4	JIS K7361:2006
Haze value	%	1.3	0.4	JIS K7136:2000
Pencil Hardness	-	H	4H	JIS K5600-5-4
Scuff resistance	-	No resistance	> 300 scuffs	S.W.#0000, 1.5kg
Contact Angle (water)	deg.	71	103	JIS R3257
Contact Angle (Oleic Acid)	deg.	13	60	JIS R3257
Static friction	-	0.28	0.19	JIS K7125, 200g
Ductility	%	> 200	150	Heat temp. 130 deg.C.

*** Test sample: Molded acrylic resin insertion with acrylic base film 125 micron thick.

OTP Characteristics



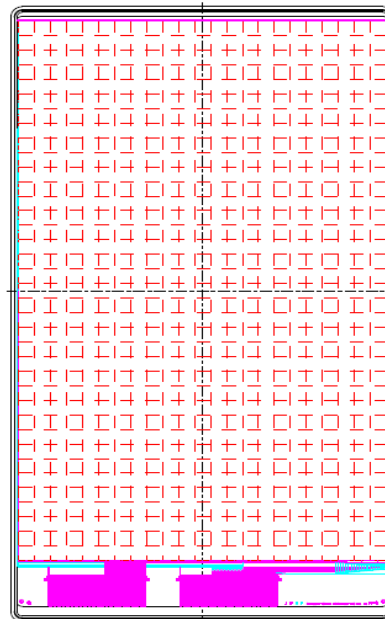
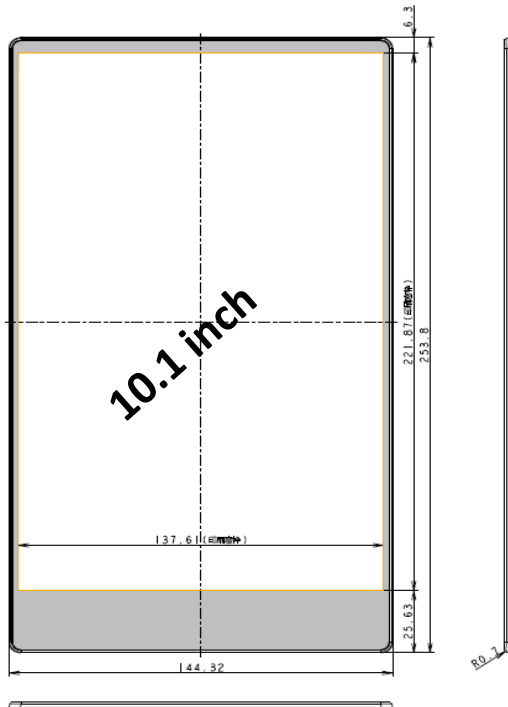
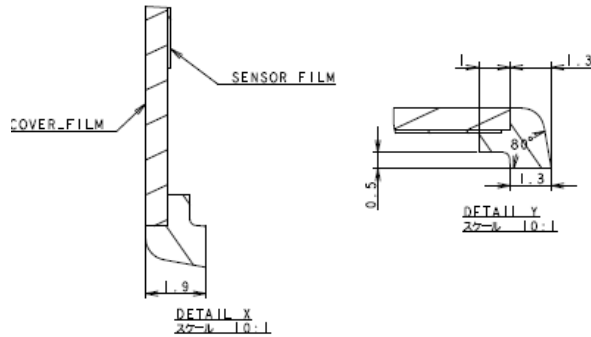
OTP- β

Integration of CLAO(2D) and Mold Frame

Replacing the glass part (conventional model)
with CLAO (Cover Lens All in One)



OTP-β 10.1"

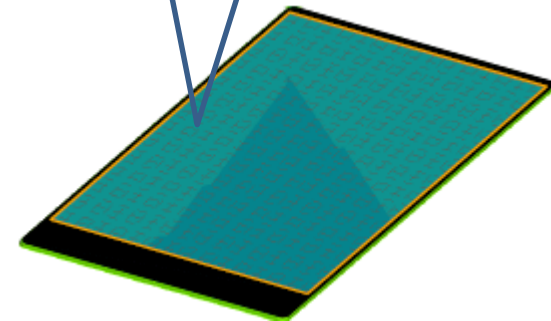


OTP-β 製品図
S=1/1

Glass Like Plastic

*New Material

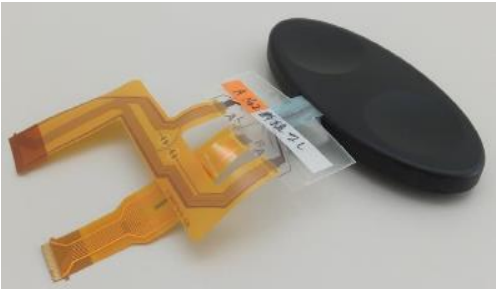
Cover Lens: 0.7mm
High Rigidity, Super High Hardness,
Scratch Resistance,
Antifouling Treatment (AF),
Sensor: Cu or Ag mesh
Total Thickness: 0.8mm



Development Outcome ~2018



OTP-3.7 :W Insert Molding

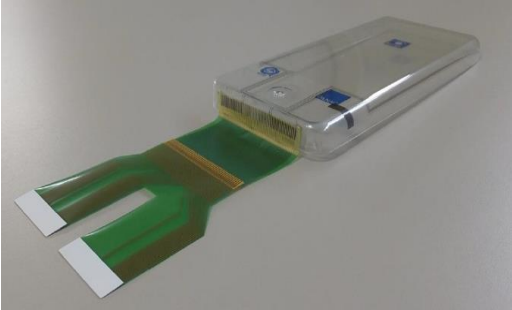


OTP : small T/P sensor SW



OTP-β : High rigidity, narrow frame, integral molding

Driving Project for Product Launch



OTP-5.3:W Insert Molding



OTP—Commander Insert Molding

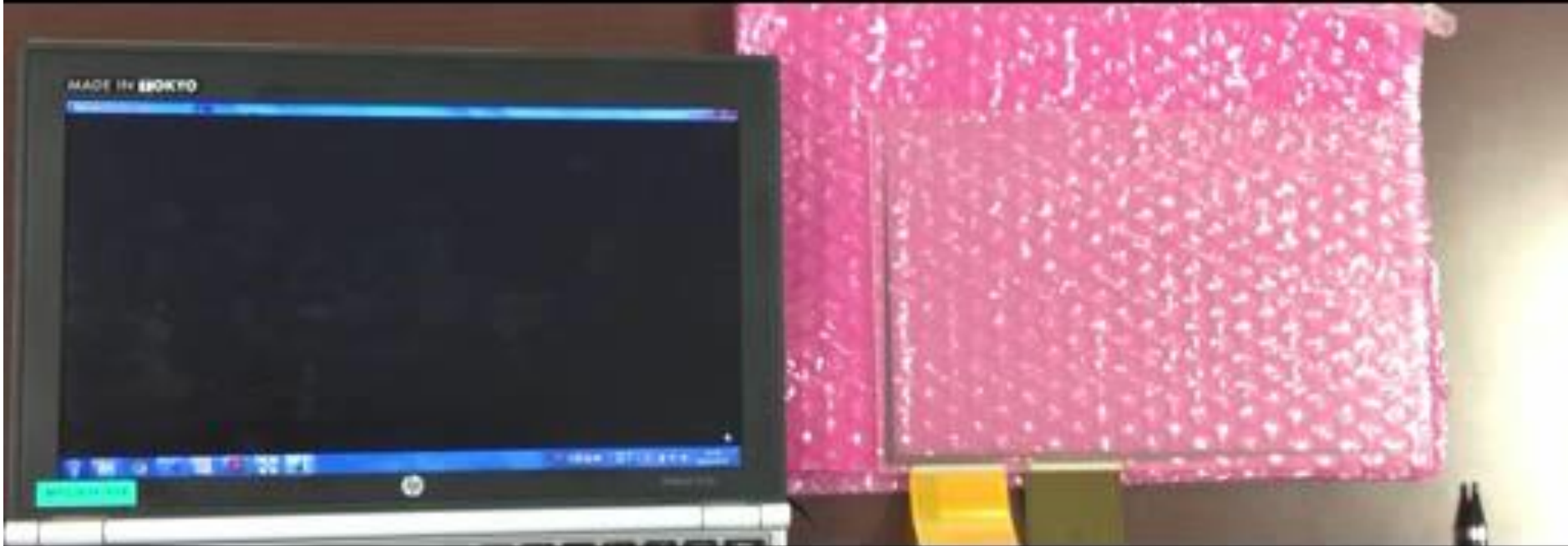


CLAO: Plastic integral T/P sensor



OTP : 3D Vehicle console panel

10.1 WS FPC Implemented sample (T/H Structure)



Target Market

* Win in the market with strong product lineup!



Mobile

Wearable

PC

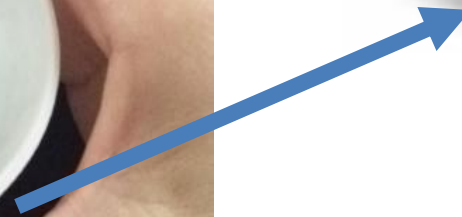
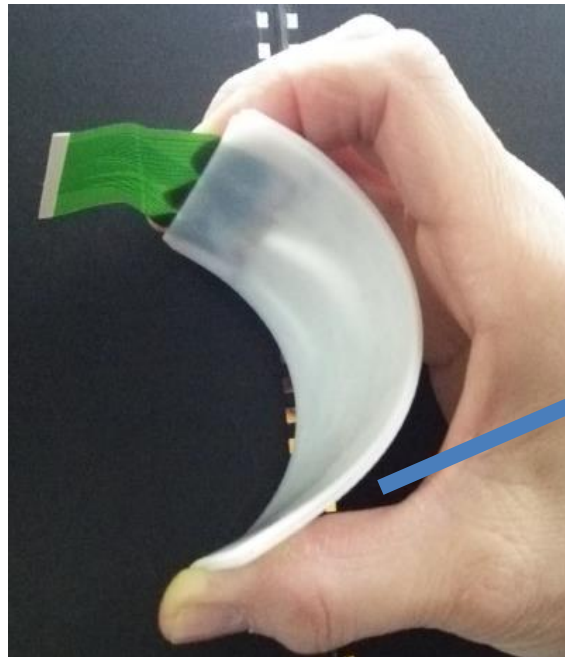
Automotive

Home
Appliance



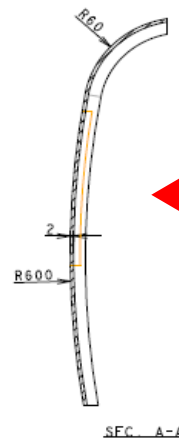
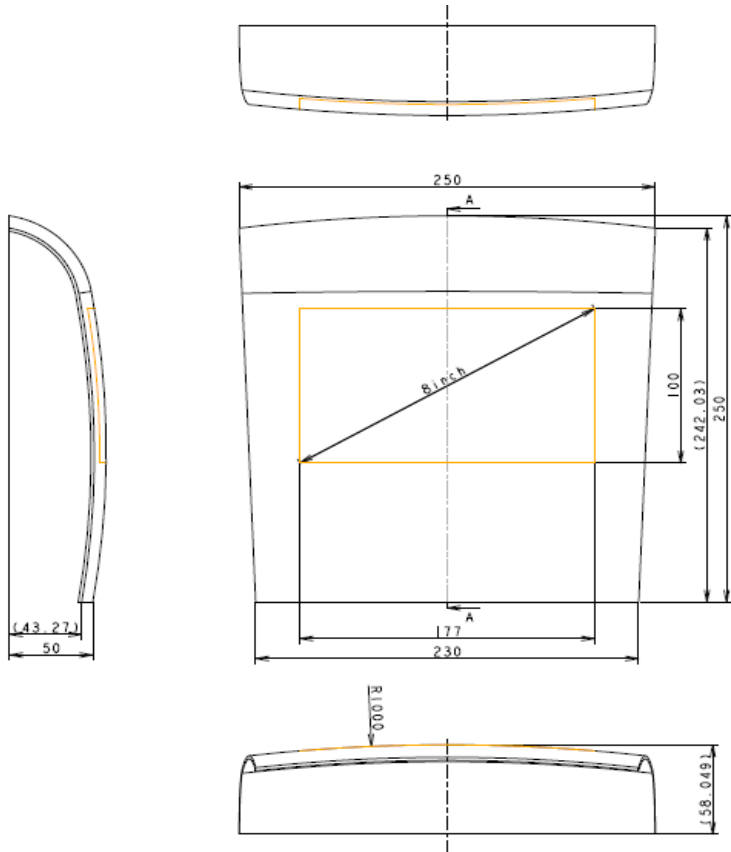
New Application Elastomer

Elastomer molding enables implementing touch panel to curved surface like belt.



Spreading application to Automotive Console Panel

Molding Test in Process : March End
Sample expected

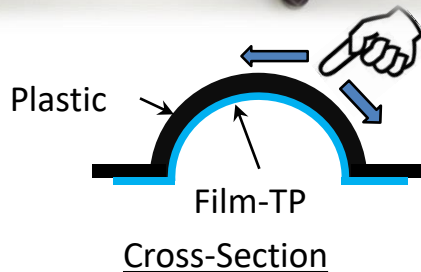


Commander

Small 
Sensor SW

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Cooperation with Futaba Corp. “Commander”

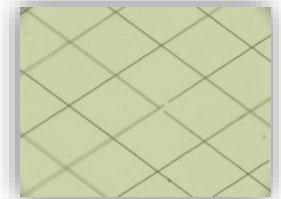


Features

- Free Form Film Material
- ✕ 3D Shape
- Multi-Touch Capability

Technologies

- Touch Sensor Forming
- Touch Sensor Insert Molding



Metal Wire Mesh



3D Forming
✕ Touch Sensor

Specifications

Item	Specification	Unit
Touch Sensor / Cover	Film TP (Metal Wire Mesh) / Plastic	
Outer Dimensions	75 (W) × 160 (D) × 14 (H)	mm
Thickness ✕ Touch Sensor/Cover	0.1 / 0.9	mm

◆ Business Partner ◆
Wonder Future Corporation



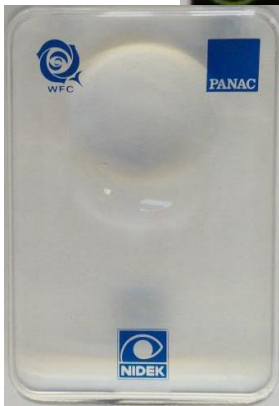
Core Technology Development Center,
Futaba Corp.

OTP Application Example Non-Transparency 1 Remote Controller

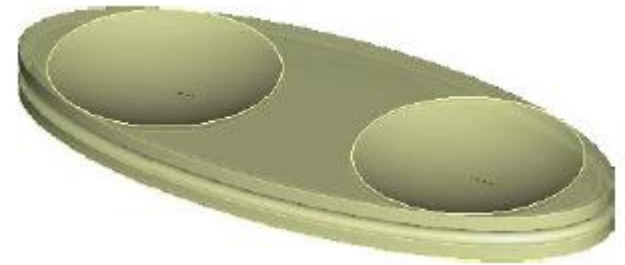


Dome-shaped part enables users to easily understand the touch pad location and operation Method without seeing the remote controller.

OTP Application Example Non-Transparency 2 Automotive



OTP Application Example Non – Transparence 3 Game Controller



OTP Application Example Non Transparence 4 Head Mount Application



Actual Products



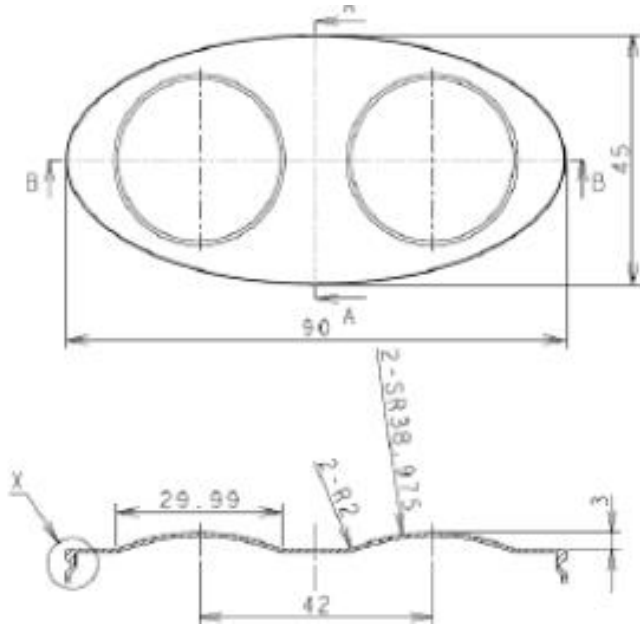
SAMSUNG: Curved surface Display Smartphone in Oct, 2013 (CNN)

**ALPS: Wearable terminal
2013 CEATEC JAPAN**



Small Sensor FPC Implemented sample

Toppan: Small sensor by Cu mesh pattern
Forming R=60 (3.7" sensor molding)



Diversion of 3.7" forming mold



FPC Implementation of small sensor A mode pattern



Small sensor casing implementation

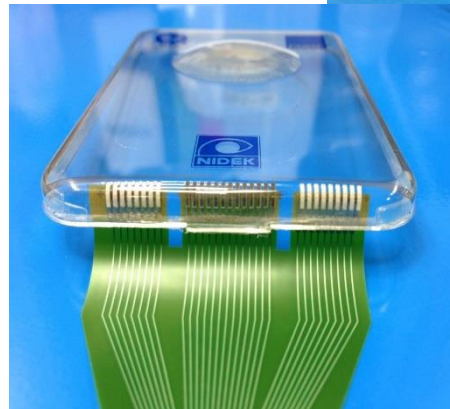
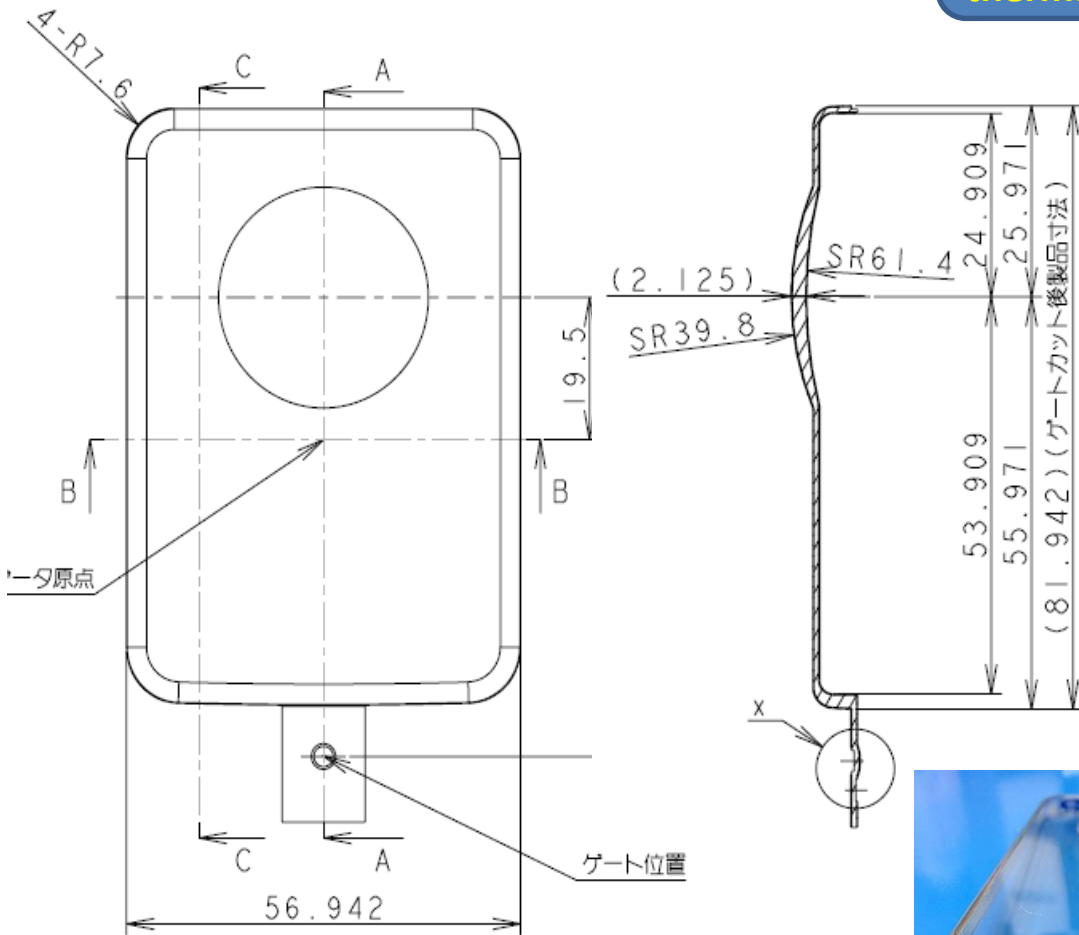
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FPC implementation sample of small sensor



3. 7WS FPC implemented sample

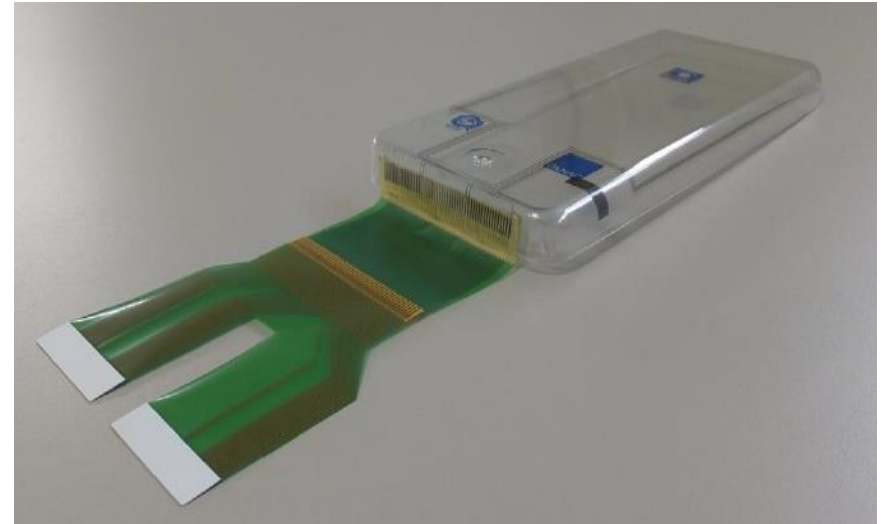
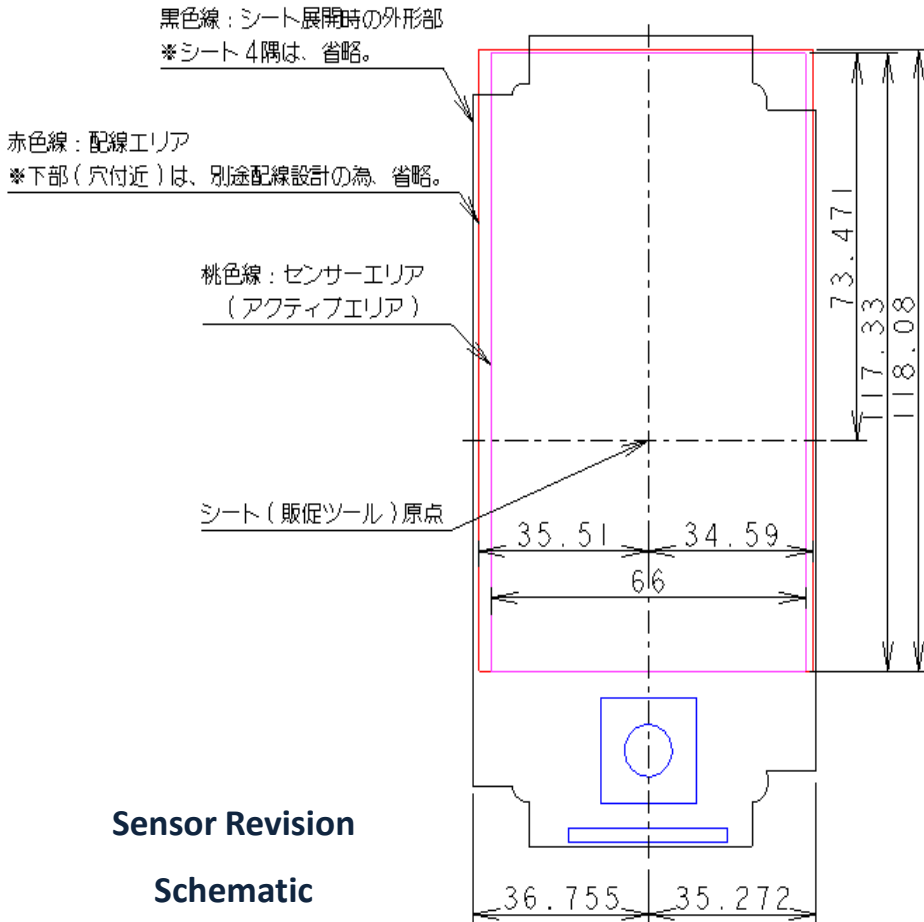
OTP integral molding using Fuji Film Exclear and FPC implementation by electromagnetic induction thermal process



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5.3 WS FPC implemented sample (IH bonding)

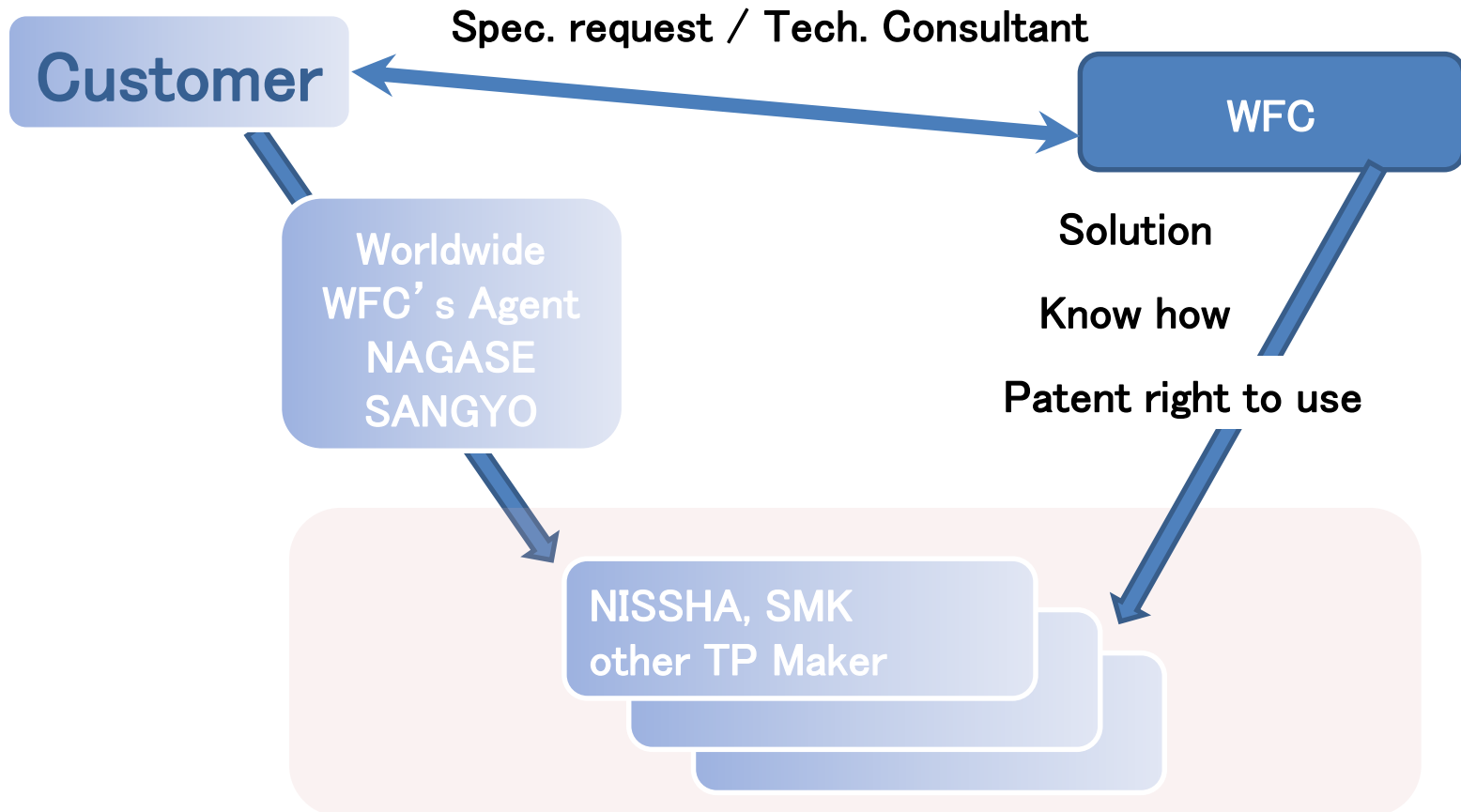
Original Pattern design by Nixx Co Ltd. :Correction of corner pattern shrinkage and curving R=1.0



Corrected FPC and Electromagnetic Induction Junction

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WFC provide the solution, know-how and the patent right to use for 3D Touch Panel to the touch panel maker which the customer recommended.



WFC Patented Technology

- I . Development of hard coating insert film,
hard coat materials, simple molding film
【Patent: 5646795】
- II . Development of outer package integral T/P (3D : OTP)
Electrostatic Capacitive Sensing Technology,
Development of W Insert Molding/Forming Process
【Patent:5347096】 【Patent:5470489】
【Patent:5739554】 【Patent:5935113】
- III . Development of electrical connection technique for
plastic materials 【Patent:5682937】